Objective: To establish preliminary reliability and validity data of the Body Image Instrument (BII), a 28-item self-report measure developed to assess body image in adolescents and young adults with cancer.

Method: As part of a larger study assessing long-term adjustment in survivors of childhood cancer, 40 males and 27 females (mean age = 19.69 years, SD = 3.87) completed the BII and two validation measures: the SF-36 health survey and the Perceived Illness Experience measure.

Results: The five BII subscales—General Appearance, Body Competence, Others' Reaction to Appearance, Value of Appearance, and Body Parts—exhibited moderate to high internal reliability and concurrent validity. No significant sex differences in body image emerged, nor was age at diagnosis or time since diagnosis significantly correlated with body image.

Conclusions: The measure may be of value in clinical settings, where it could be used to identify adjustment problems related to body image disturbance in pediatric cancer patients.

Key words: pediatric cancer; adolescence; body image; adjustment; chronic illness; measurement.
state to long-term psychological and emotional issues (Pendley et al., 1997). It has been suggested (Varni, Katz, Colegrove, & Dolgin, 1995) that BI should be conceptualized not only as an outcome variable but also as a potentially important predictor of long-term psychological adjustment. Supporting this is evidence of positive links between BI and self-esteem (e.g., Abell & Richardson, 1996) and negative links with depression (e.g., Noles, Cash, & Winstead, 1985).

BI Measurement for Pediatric Cancer Patients

Work attempting to clarify the role of BI, both as an outcome variable and a predictor of psychological adjustment, in persons with cancer and other chronic conditions has been slowed by the lack of a comprehensive and standardized BI measure (Hopwood, 1993; Vamos, 1993). Existing measures have met with some criticism when considered for use with the chronically ill. For example, Secord and Jourard's (1953) Body Cathexis-Self Cathexis Scale, which attempts to assess satisfaction with body parts and processes, has been criticized for lacking accuracy (Sanger & Reznikoff, 1981) and being too lengthy to use in clinical settings (Hopwood, 1992).

Measures developed within the field of eating disorders are also less than ideal for this population, especially where the focus is on body size distortion. Individuals who score in the range typically indicative of distortion may be reporting genuine awareness or distress related to body parts affected by the illness as opposed to irrational judgments of their body shape (Hopwood, 1992). Moreover, instruments measuring individuals' feelings about their physical appearance, typically focusing on weight-related appearance, do not touch upon all of the areas relevant to chronic illness. A comprehensive measure should include an assessment of feelings about specific body parts affected by treatment, reactions of others to the visible marks of illness, and views about body functioning. Additionally, many of these scales are validated on samples consisting mostly or wholly of females and therefore may not be valid for males.

Several global quality of life (QOL) measures include a subscale to measure BI. As a group these assessments vary widely in their content and format (e.g., observer-rated versus self-rated), and many have no reported psychometric properties (Hopwood, 1992). They do have the advantage, however, of being sensitive to those areas of BI most likely to be affected by chemotherapy and other aspects of cancer treatment. Some adolescent measures of self-concept (e.g., Harter, 1988) also include subscales to measure BI but are directed at healthy individuals and lack sensitivity for the pediatric cancer population.

It is evident, then, that no BI measures are entirely appropriate for use with young people with cancer. Existing measures fall short on one or more of the following criteria: (1) inclusion of domains relevant to individuals with cancer, (2) possession of established psychometric properties, (3) appropriate for both sexes, (4) brief enough to use in clinical settings. In this study, we report the development and preliminary validation of the Body Image Instrument (BII), which is a first attempt to develop a BI measure sensitive to the needs of young people treated for cancer.

Method

Participants

The names of all pediatric cancer patients who were off treatment at the time of the study were obtained from three hospitals in southwest and one in central England (a specialist orthopedic oncology service). Initial criteria for inclusion were that participants were English speakers who had been at least 5 years off treatment and were older than 15 years of age. Given the relatively poor survival rate in children with bone tumors (Grimer, 1996) and higher mean age at diagnosis, we found it necessary to adopt more lenient criteria for patients recruited from the orthopedic center: we required that these patients were at least 7 years of age, with a minimum posttreatment follow-up of 6 months. Patients actively undergoing treatment for metastatic disease (spreading of the tumor) were excluded.

Of the 119 patients initially identified and sent invitations to participate, 79 agreed to take part (a response rate of 66%), 8 refused, and 29 did not respond following two letters. There were no significant differences between participants and nonparticipants in terms of age or time since diagnosis or available clinical data. The ratio of boys to girls in the participant group was not significantly different from that of nonparticipants.

Forty males and 27 females with a mean age of
19.69 years (range = 12.45–28.80; SD = 3.87) participated in the study. Mean time since diagnosis was 10.31 years (range = 3.00–19.53; SD = 4.27). There were no significant differences between males and females in terms of age (respective means = 20.26 and 18.84 years) or time since diagnosis (respective means = 10.74 and 9.67 years). All were white Caucasians. Participants and their parents represented a diverse spread in terms of employment, educational levels, and geographic location. Participants’ diagnoses were bone tumors (55%), leukemias (21%), liver or kidney tumors (7%), Hodgkins lymphomas (3%), brain/head tumors (4%), and other solid tumors (9%). Depending on tumor type and severity, treatment consisted of chemotherapy, radiation therapy, surgery, or a combination of the three. All patients with bone tumors additionally underwent limb-salvage surgery.

**Procedure**

Approval to conduct the study was obtained separately from ethics committees at all participating hospitals. An introductory letter explaining the purpose of the study and invitation to participate was sent to potential subjects along with a return form (postage paid). Parents of children under 16 were sent a letter and asked to discuss the study with their child.

Interviews were conducted in participants’ homes, except where patients preferred to be seen in the follow-up clinic (n = 3). At the interview written consent was obtained from participants (parents of children under 16 were asked to add their signature to their child’s). Participants were asked to complete questionnaires following the interview. (The interview focused on patients’ experiences regarding the diagnosis and treatment and implications of the disease for current and anticipated functioning. These data will be reported separately). Tumor type, date of birth, and time since diagnosis were obtained from medical records.

**Development of the BI Instrument**

Several sources guided construction of the BII. These included interviews with pediatric cancer patients from an earlier study (Eiser, 1996) and a review of work concerned with identifying aspects of body image relevant to cancer patients (e.g., Price, 1992; Vamos, 1993). Item generation was further informed by a review of existing BI items in QOL measures and items recommended by Hopwood (1992). This process led to the development of 38 items organized around 5 themes: **General Appearance** (patients’ feelings about their physical appearance), **Body Competence** (feelings about their own physical strength, stamina, and coordination), **Others’ Reaction to Appearance** (patients’ perceptions of how others react to their appearance), **Value of Appearance** (the relative importance of appearance), and **Body Parts** (feelings about body parts commonly affected by cancer treatment). Items were rated on a 5-point Likert-type scale ranging from “disagree” to “agree.” After reversal of some items, higher scores indicated stronger agreement with each statement and thus more positive body image.

**Validity Measures: QOL Scales**

The concurrent validity of the BII subscales was assessed by correlating them with two QOL measures: the SF-36 health survey (Ware, Snow, Kosinski, & Gandek, 1993), a generic QOL measure, and the Perceived Illness Experience scale (Eiser, Havermans, Craft, & Kernahan, 1995), a well-being measure designed specifically for young people with cancer.

*The SF-36 Health Survey.* The SF-36 contains eight scales designed to tap health from the patient’s point of view. The scales assess the extent to which physical health limits a range of physical activities (Physical Functioning); physical health limits work (Role Functioning-Physical); pain is experienced and interferes with work (Bodily Pain); one feels energetic versus tired and worn out (Vitality); physical health or emotional difficulties interfere with social activities (Social Functioning); emotional problems interfere with work (Role Functioning-Emotional). The scale also assesses depression, anxiety, behavioral-emotional control, and general positive affect (Mental Health) and elicits a personal evaluation of present and future physical health (General Health). Normalized scores range from 0–100, with higher scores indicating more positive health status. The SF-36 was designed for persons 14 years of age and older and has demonstrated internal reliability and construct validity.

*The Perceived Illness Experience (PIE) Measure.* The PIE was constructed to measure how young people with cancer perceive their experiences with the illness. There are 10 subscales that assess the extent to which respondents feel their appearance has been affected by illness and treatment (Physical Appearance...
Table I. Internal Reliability and Intercorrelations of the BII Subscales

<table>
<thead>
<tr>
<th>Subscale</th>
<th>General Appearance</th>
<th>Body Competence</th>
<th>Others’ Reaction to Appearance</th>
<th>Value of Appearance</th>
<th>Body Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal reliability</td>
<td></td>
<td></td>
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<tr>
<td>Cronbach’s $\alpha$</td>
<td>.81</td>
<td>.74</td>
<td>.85</td>
<td>.71</td>
<td>.68</td>
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<tr>
<td>Item-total correlations</td>
<td></td>
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</tr>
<tr>
<td>Mean</td>
<td>.50</td>
<td>.45</td>
<td>.70</td>
<td>.51</td>
<td>.47</td>
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<tr>
<td>Range</td>
<td>.27–.71</td>
<td>.30–.56</td>
<td>.64–.77</td>
<td>.40–.63</td>
<td>.38–.61</td>
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<tr>
<td>Subscale intercorrelations*</td>
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<td></td>
</tr>
<tr>
<td>GA</td>
<td>—</td>
<td>.49</td>
<td>.42</td>
<td>.14</td>
<td>.46</td>
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<tr>
<td>BC</td>
<td>.70***</td>
<td>—</td>
<td>.27</td>
<td>.08</td>
<td>.22</td>
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<tr>
<td>OA</td>
<td>.65***</td>
<td>.52***</td>
<td>—</td>
<td>.10</td>
<td>.29</td>
</tr>
<tr>
<td>VA</td>
<td>.38***</td>
<td>.28</td>
<td>.32</td>
<td>—</td>
<td>.16</td>
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<tr>
<td>Bpt</td>
<td>.68***</td>
<td>.47***</td>
<td>.54***</td>
<td>.40***</td>
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</tr>
</tbody>
</table>

*Values below the diagonal are correlations, those above are $r^2$, expressed as proportions. **p < .001.

Results

Given the large number of correlations computed in this analysis, a Bonferroni correction was applied throughout this paper, and significance levels were set to $p < .001$.

Items analyses identified 10 items with item-total correlations below .30, which were eliminated from the measure. The final 28-item BII (see Appendix) is comprised of 5 subscales corresponding to the 5 themes listed above. Frequency distributions of the 28 items were examined and reveal that the entire range of response options was used for each item, indicating the capacity to discriminate between participants. Means and standard deviations ($M, SD$) for the total sample are as follows: General Appearance (3.56, 0.90), Body Competence (3.44, 0.91), Others’ Reaction to Appearance (4.34, 0.95), Value of Appearance (3.54, 0.96), and Body Parts (3.60, 1.01). There were no significant differences between males and females on these subscales. As slightly more than half of the participants were bone tumor patients, the means of this subgroup were compared with the means of the rest of the sample, but no significant differences emerged.

First-order partial correlations were computed to assess the unique relationships of age at diagnosis and time since diagnosis with the BII subscales. No significant associations emerged, indicating that BI could not be predicted by these developmental/clinical variables.

Reliability. The results of the reliability analysis appear in Table I. Cronbach’s $\alpha$ coefficients demonstrate moderate internal reliability for Body Competence ($\alpha = .74$), Body Parts ($\alpha = .68$) and Value of Appearance ($\alpha = .71$). General Appearance ($\alpha = .81$) and Others’ Reaction to Appearance ($\alpha = .85$) were more highly internally consistent. All but one of the item-total correlations in the BII subscales were medium ($\geq .30$) to high ($\geq .50$) in magnitude (Cohen, 1977), indicating homogeneity within the subscales.

BII Subscale Intercorrelations. A correlation matrix of the BII subscales was computed to determine the extent to which each subscale taps a substantively different domain of BI (Table I). The squared correlations ($r^2$), indicating the proportion of shared variance, range from .08 to .49 and signify that each subscale contains more unique than shared variance.
Validity. Concurrent validity was assessed by computing Pearson product-moment correlations between the BII subscales and the subscales of the QOL measures. Neither age at diagnosis nor time since diagnosis was significantly correlated with the validity measures; thus, they were not included as covariates. Prior to all analyses, and to ease interpretation, the PIE subscale scores were reversed so that they ran in the same direction as the BII and SF-36 scores (i.e., higher scores indicated more positive perceptions). The results of the validity analysis appear in Table II. Correlations between the BII and QOL subscales generally fall into the expected pattern. Body Competence is significantly positively correlated with physically and socially oriented subscales. The BII subscales concerned with respondents' own appearance (i.e., General Appearance, Others' Reaction to Appearance, and Body Parts) correlated significantly positively with QOL subscales tapping social and emotional domains but not with subscales tapping physical functioning. Finally, all but the Value of Appearance subscales of the BII were significantly and positively correlated with the Food subscale of the PIE.

Discussion

The BII demonstrated adequate internal reliability and concurrent validity for a new measure. A number of correlations in the validity analysis also confirm previous research findings. For example, the potential association between BI and food-related conflict has been identified in young people with chronic disorders (Rodin, Daneman, & deGroot, 1993), and peer acceptance has been shown to be positively related to perceived physical appearance in those with pediatric conditions (La Greca, 1990). The next stage of development should involve determining the extent to which it is sensitive to the actual changes in BI that might be expected over the course of cancer treatment and remission.

In this study there were no significant age or sex differences on subscale scores. This is in contrast to work with healthy individuals (Pliner, Chaiken, & Flett, 1990), where BI has been shown to be a function of sex and age. It may be that similar effects would be found with a larger, more homogeneous sample of tumor patients. Future work with the BII should involve gathering data on healthy adoles-
cents and young adults to tease apart what may be
general gender effects from those that may be at-
tributed to cancer. (This strategy would also make it
possible to assemble a group sufficiently large
enough to examine the factor structure of the in-
strument.)

These results should be considered heuristic
given the small sample size, heterogeneity of the
sample in terms of diagnosis, age at diagnosis, time
since diagnosis, and the lack of racial diversity. Re-
garding the first of these limitations, we did not
have a large enough sample to determine the factor
structure of the BII in the current study, and this is
an important next step. In addition, our sample was
not representative of all cancer patients, as, given
the specialty of the orthopedic center involved in
this study, a greater proportion of bone tumor pa-
tients were recruited. These patients would be ex-
pected to experience more mobility and physical
activity restrictions than many other patients. As a
result, they may have scored lower on the Body
Competence subscale of the BII as well as the QOL
measures.

This preliminary investigation of the BII has
demonstrated its potential value in measuring BI in
survivors of pediatric cancer. We hope that ulti-
mately the measure will allow work to progress that
clarifies the impact of cancer on the developing BI.
Understanding this process has important clinical
implications in terms of detecting and minimizing
potential emotional adjustment problems in pediat-
ric cancer patients.

Appendix

The Body Image Instrument

General Appearance
1. I am very satisfied with my height
2. I find it difficult to look at myself naked
3. I think I look good in a swimming costume
4. I am very satisfied with my weight

Body Competence
5. I think my body is well proportioned
6. I am as well developed physically as my friends
7. I don’t mind changing my clothes in front of other people
8. I am happy with the way I look
9. I cannot always wear the clothes I like because of how I look

Others’ Reaction to Appearance
10. I wish I was more physically fit
11. My body is strong enough for all I want to do
12. I am too badly coordinated to take part in games or sport
13. I worry about knocking things over
14. I worry about falling over
15. I think I get tired more easily than my friends
16. I am not able to move as quickly as I would like

Value of Appearance
17. I feel people stare at me in the street
18. I feel people avoid me because of the way I look
19. I feel my appearance makes it difficult for people to like me
20. I am afraid people will laugh at me because of the way I look

Body Parts
21. I feel self-conscious about the way my hair looks
22. I feel self-conscious about the way my face and neck look
23. I feel self-conscious about the way my arms and shoulders look
24. I feel self-conscious about the way my stomach looks

*Items 2, 9, 10, 12-22, and 25-28 are reversed before scoring.

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